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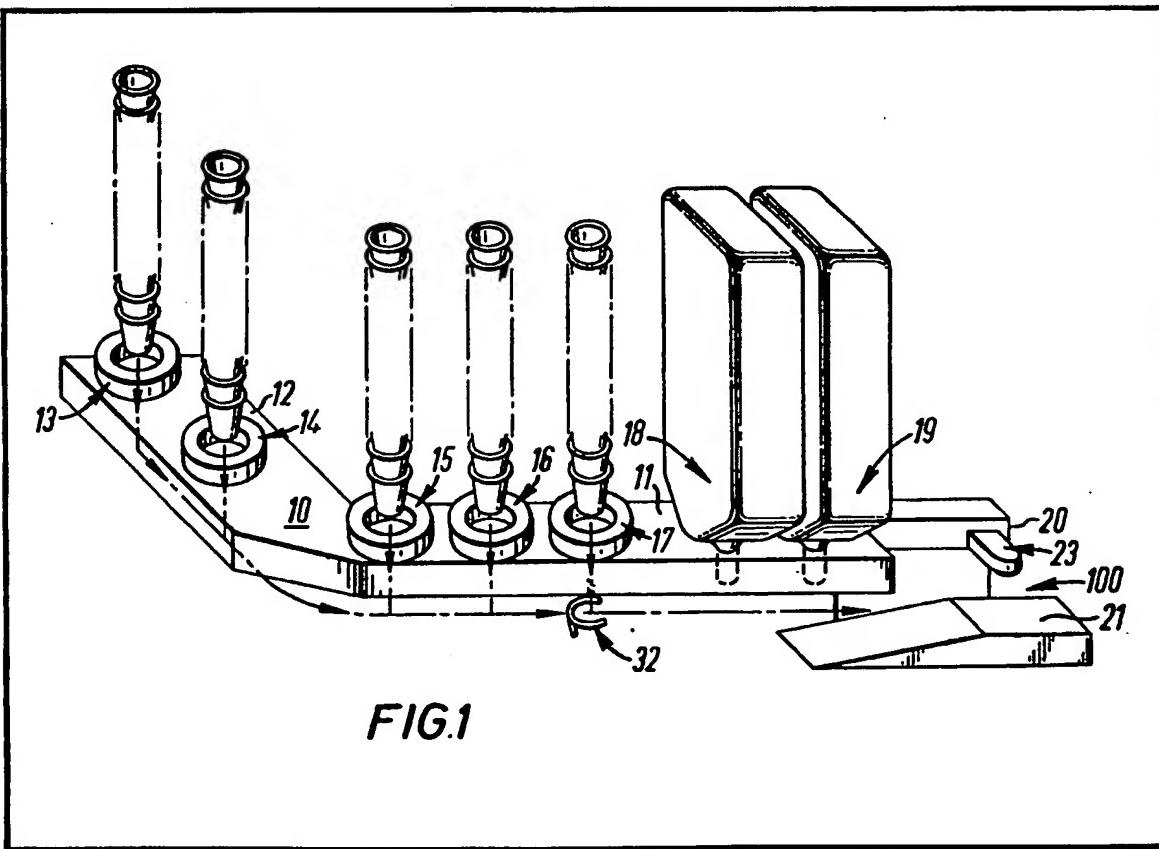
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(54) Cup dispense assembly

(57) A cup dispensing assembly for a vending machine which assembly comprises a cup receiving platform (21) for receiving a cup at a dispensing station in a vending machine, a cup transport means including a cup carriage (32) and associated cup support for transport of a cup to said cup receiving platform, reversing means for reversing the motion of the transport means when the cup is juxtaposed and supported by the cup receiving platform at the dispensing station, the arrangement being such that as the

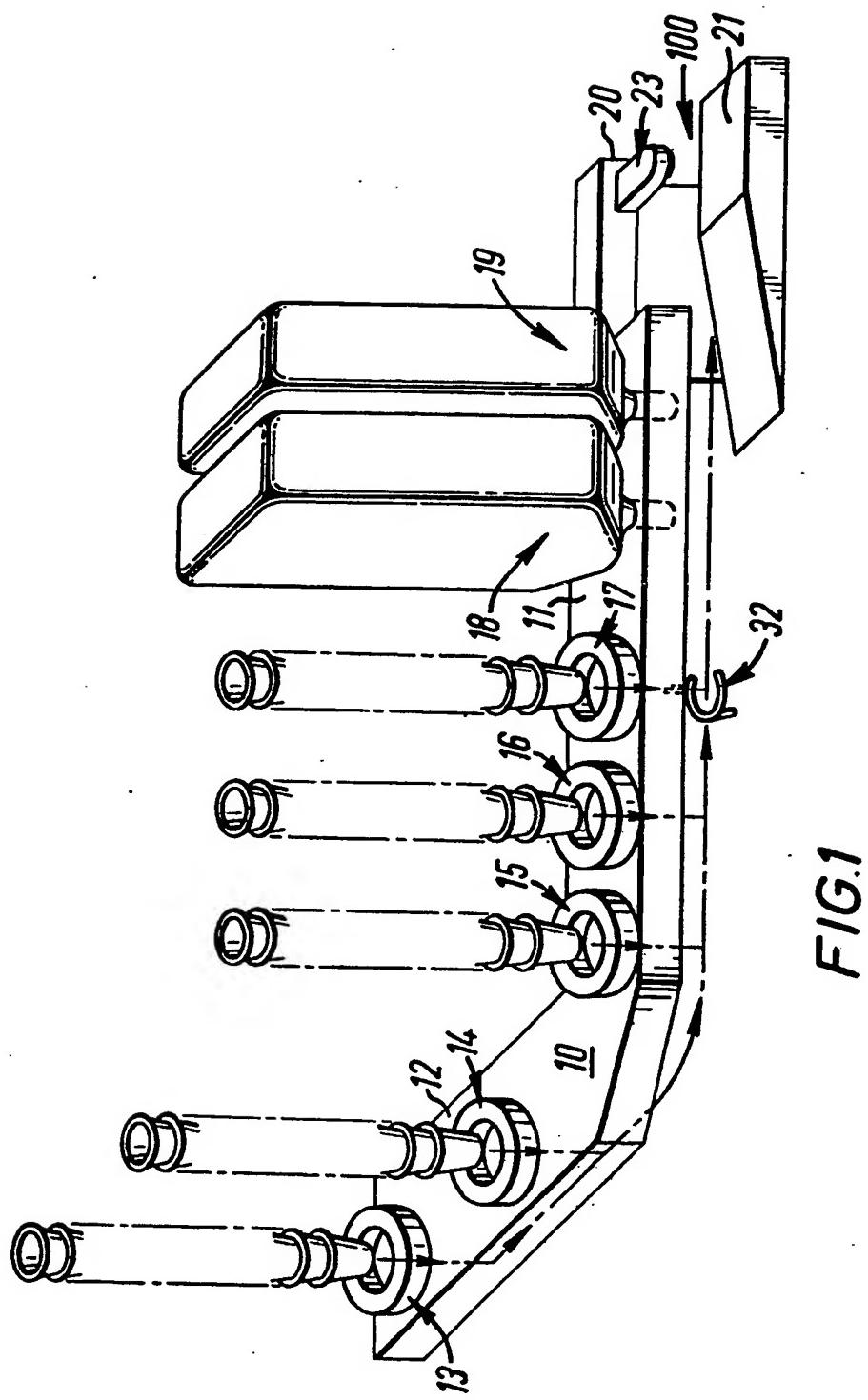
cup is conveyed forwardly towards the cup dispensing station convergence between the receiving platform and the cup support occurs so that the cup rides up a surface of the platform whereby continued forward movement of the cup carriage results in further convergence between the cup support and platform to produce relative movement between the cup and the cup support to an extent sufficient for disengagement of the cup from the cup support on reversal of transport means without substantial spillage of the contents thereof.



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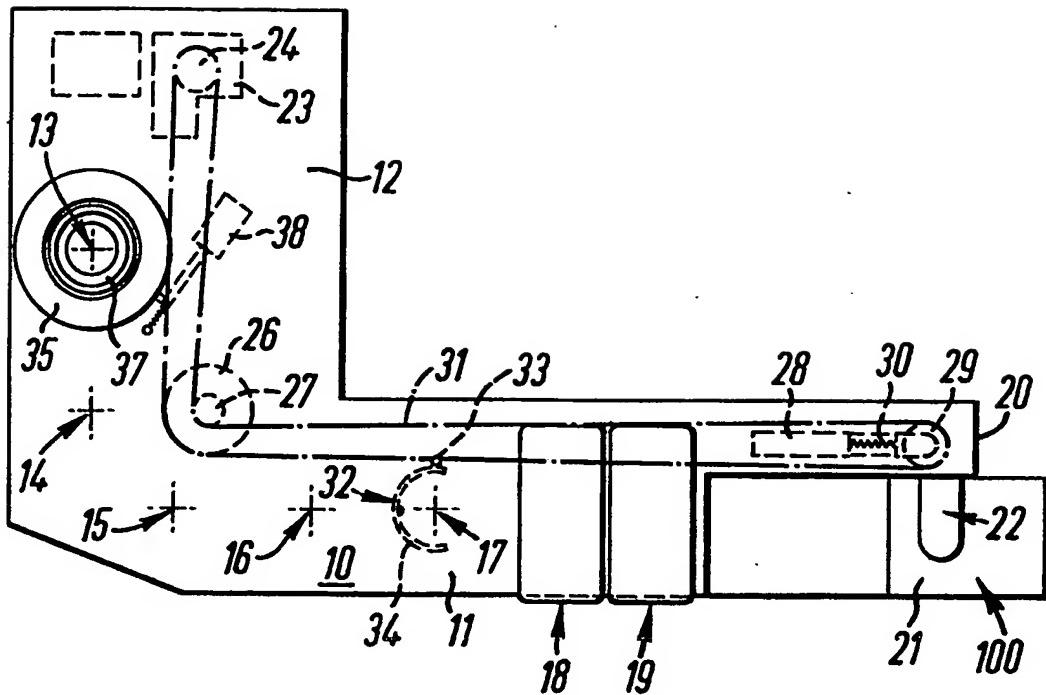


FIG. 2

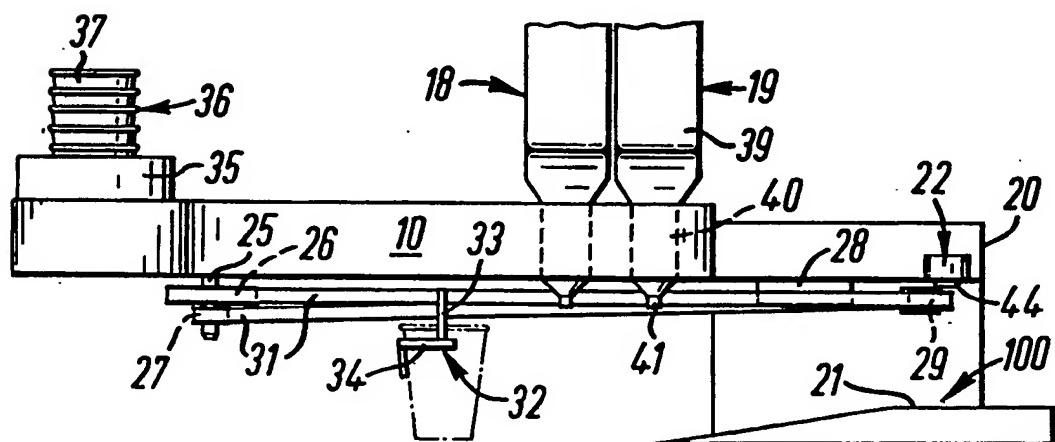


FIG. 3

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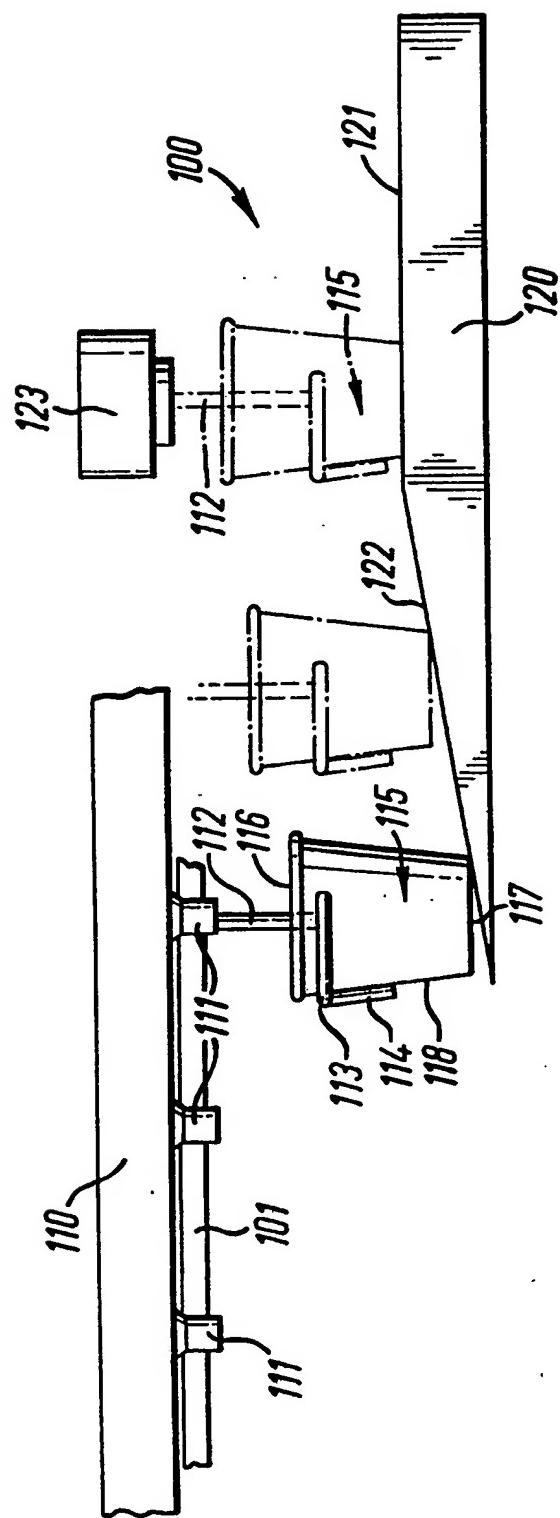
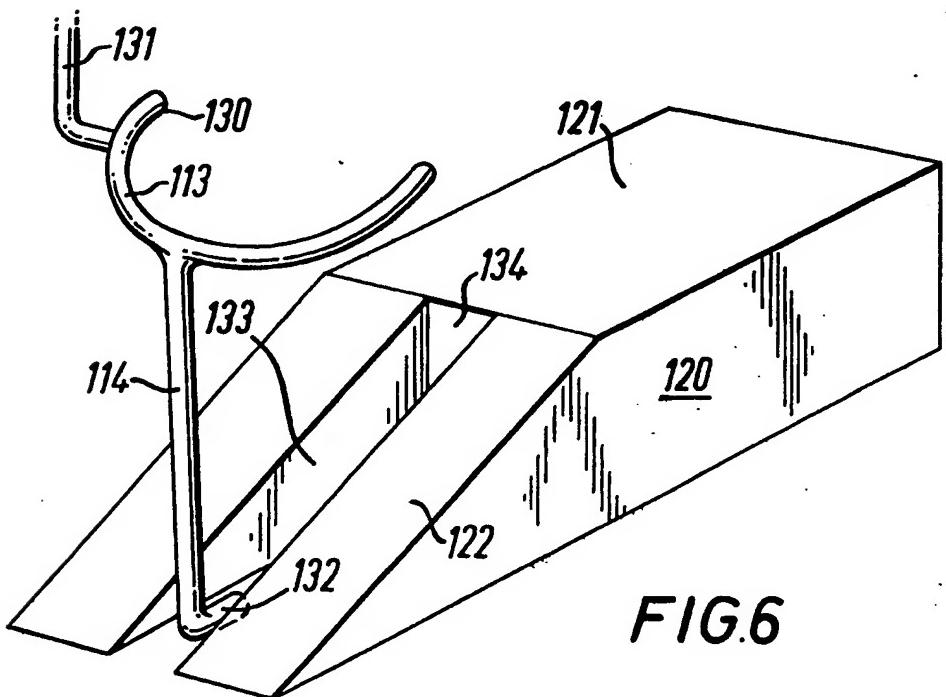
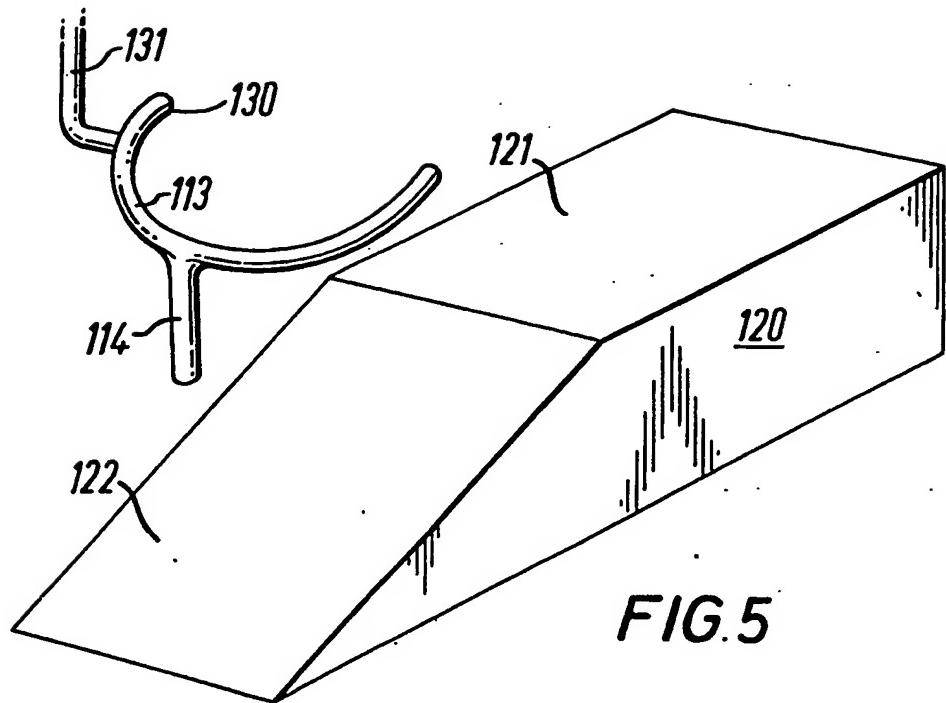


FIG. 4

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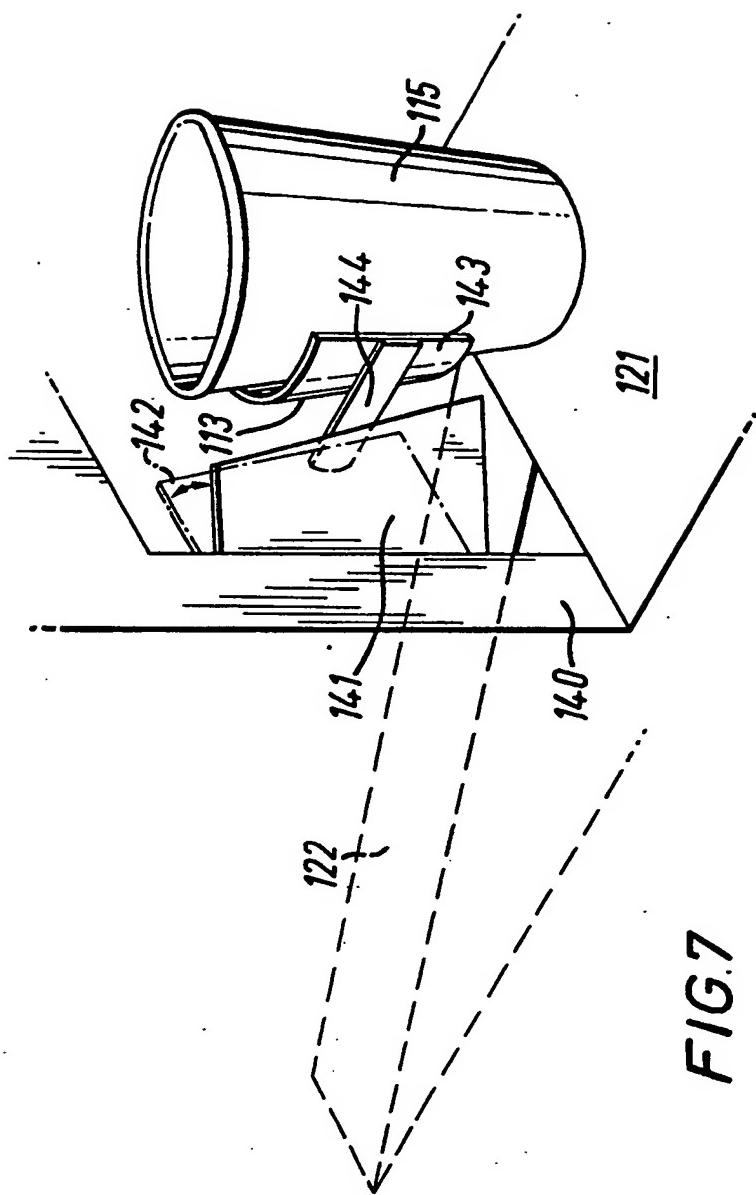


FIG.7

## SPECIFICATION

### Cup dispense assembly

5 This invention relates to vending machines and has particular reference to cup dispensing assemblies for vending machines.

Vending machines have, hitherto, dispensed a cup at a consumer receiving station and the 10 ingredients are then dispensed into a cup whereupon the consumer takes the cup from the station.

With the development of improved vending systems, a cup transport system may be employed for transporting a cup from a stack to a dispensing station. In practice, the cup is provided with ingredients either on an in-cup basis or from ingredient dispensing stations on route between cup dispense position and 20 the consumer receiving station.

Various cup drop dispense systems have been proposed for use in conjunction with vending machines incorporating transport means for the cup. Where the cup contains 25 either a fine powder or liquid the problem exists in that if the cup is dropped, the powder is stirred up and distributed as a fine powder around the cup dispensing station or liquid is spilled in the area of the cup dispensing station.

According to the present invention there is provided a cup dispensing assembly for a vending machine which assembly comprises a cup receiving platform for receiving a cup at a dispensing station in a vending machine, a cup transport means including a cup carriage and associated cup support for transport of a cup to said cup receiving platform, reversing means for reversing the motion of the transport means when the cup is juxtaposed and supported by the cup receiving platform at the dispensing station, the arrangement being such that as the cup is conveyed forwardly towards the cup dispensing station convergence between the receiving platform and the cup support occurs so that the cup rides up a surface of the platform whereby continued forward movement of the cup carriage results in further convergence between the cup support and platform to produce relative movement between the cup and the cup support to an extent sufficient for disengagement of the cup from the cup support on reversal of transport means without substantial spillage of 55 the contents thereof.

In a particular embodiment of the present invention closure means may be provided juxtaposed the receiving platform to prevent the cup being returned down the ramp after 60 disengagement from the cup support. The closure means is preferably a spring loaded flap adapted to open to admit cup and carriage and through which the carriage and associated cup support are returned after disengagement with the cup *per se*. The closure

may be spring loaded to a closed position and the carriage may contain a retaining arm adapted to engage with the closure to maintain it in an open position to permit return of 70 the carriage to its datum position.

The cup receiving platform may have a substantially horizontal planar surface defining the cup dispensing position and an inclined surface providing the means whereby convergence between the platform and the cup occurs, the arrangement being such that the carriage drives the cup up the inclined surface to the planar surface thereby raising the cup from the cup support so that on reversing the 80 conveyor the cup support is disengaged from the cup and leaves the cup in a dispensing position. The cup is preferably tapered toward the base to form a hollow frustocone in which the open mouth has an area greater than the 85 base. The cup support may comprise a substantially horizontally disposed circumferential part ring extending slightly over the semi-circle and open in the front portion thereof when considered in the direction of forward 90 travel.

In normal use the cup is deposited from a cup stack into the ring and is supported thereby at a point toward but spaced below the open mouth of the cup. As the conveyor 95 moves forward the base of the cup contacts the inclined surface of the cup receiving platform and continued forward movement results in the raising of the cup relative to the cup support until the base of the cup is on the 100 planar cup platform in the dispensing position. At this stage the cup has been raised sufficiently so that in the plane of the cup support ring the diameter of the cup is smaller than the opening between the extremities of 105 the cup support ring and on reversal of the conveyor the cup support ring is withdrawn from the cup to leave the cup on the cup receiving platform.

In a particular embodiment of the cup carriage and associated support ring, said circumferential part ring element is provided with a downwardly depending spine portion adapted to provide support on the back of the cup in the direction of forward movement to 115 distribute the pressure on the cup as the cup rides up the inclined plane of the cup platform.

In an alternative embodiment the depending spine may extend downwardly to the base 120 of the cup and may further include a forwardly extending portion adapted to engage under the base of the cup to provide positive support for the cup from the base. In this embodiment, the cup receiving platform is 125 provided with a central recess in the inclined plane at least as far as the cup platform, adapted to accommodate the depending spine, the spacing of the recess being sufficient to accommodate the depending spine and 130 cup base support and to engage with the base

- of the cup to urge the cup upwardly with regard to the cup support ring on continued forward movement of the latter so that on completion of the forward travel of the cup platform and reversal of the conveyor results in the cup remaining on the cup support platform and withdrawal of the cup support ring and associated carriage to its datum position.
- 10 The present invention also includes a vending machine comprising a cup transport means at least one cup receiving station, a carriage member operatively connected with said transport means for movement between the cup receiving station and the cup dispensing station, motor means for driving the transport means, control means for controlling movement of the transport means and a plurality of cups in at least one cup receiving station wherein each cup contains at least part of the ingredients for forming a beverage, the arrangement being such that in operation the cup transport means is controlled to bring the carriage in juxtaposition with the cup receiving station whereby a cup containing ingredients is dispensed into the carriage and the control means thereafter causes or allows the motor means to drive the conveyor and the carriage to the cup dispensing station.
- 20 The cup transport means may be a conveyor of the kind described in co-pending Application No. 8789/78. Serial No. 1566853 A plurality of cup receiving stations may be provided each receiving station being associated with a different ingredient for forming a beverage. The vending machine may include a beverage selection means whereby on selecting a particular beverage the transport means causes the carriage member to move in juxtaposition with the cup receiving station having a cup containing the desired ingredients for dispensing thereto. At least one ingredient dispense station may be provided between the cup receiving stations and the cup dispensing assembly so that additional ingredients may be available for being dispensed into the cup carried by said carriage.
- In this way it is possible for a machine to have a plurality of cup dispensers each associated with a stack of cups containing a specific basic ingredient. Thus, one might have for example, a machine having cups stacked for tomato soup, oxtail soup, tea, coffee and cocoa and may additionally have separate ingredient dispense stations for say, milk and sugar.
- A consumer selecting coffee together with milk and sugar will make his selection on a control panel and on instructing dispense, the conveyor carriage will be transported to the cup stack containing ingredients for coffee whereupon a cup will be dispensed, will be transported by the conveyor to the first ingredient dispenser where the cup stops and a

portion of additional ingredients of either milk or sugar is dispensed and the cup is then transported to the second ingredient dispenser where the second ingredient is dispensed and thereafter the cup containing the ingredients is transported to the cup dispensing station for dispense and subsequent supply of water to complete the preparation of the beverage.

Following is a description by way of example only and with reference to the accompanying drawings of methods of carrying the invention into effect.

In the drawings:

Figure 1 is a diagrammatic representation of a vending machine transport system in accordance with the present invention.

Figure 2 is a plan view of Fig. 1.

Figure 3 is a front view of Fig. 2.

Figure 4 is a diagrammatic elevation of a cup dispensing assembly in accordance with the present invention.

Figure 5 is a perspective of the cup platform and cup support.

Figure 6 is a perspective of an alternative embodiment of the cup support and cup platform of Fig. 5; and

Figure 7 is a perspective of a further embodiment in accordance with the present invention.

95 The vending machine illustrated in Figs. 1 to 5 comprises a support platform 10 having a front longitudinal portion 11 and a side portion 12 extending substantially at right angles to the longitudinal axis of the front portion 11, the arrangement being such that platform 10 has overall a generally L-shape configuration. The side portion 12 and the adjacent part of front portion 11 carries a plurality of cup dispense stations 13, 14, 15, 16 and 17. The remainder of the front portion 11 of platform 10 also accommodates two ingredient dispense stations 18 and 19. Front portion 11 terminates at its extremity 20 in a cup dispense station 21, and water dispense station 22.

Platform 10 carries toward the rearward extremity of side portion 12 a motor 23 adapted to drive a spindle (not shown) carrying pulley 24. At the junction of front portion 11 and side portion 12 there is provided a spindle 25 extending downwardly from platform 10 carrying first and second idler pulleys 26 and 27 respectively. The extremity 20 of the front portion 11 has a depending member

120 28 which carries a pulley 29 which is spring loaded toward extremity 20 by means of spring 30. A conveyor tape or belt 31 is passed about the pulleys 24 and 26, 29 and 27 to form a continuous loop and is tensioned by means of spring 30. A cup carriage indicated generally at 32 comprises an arm 33, the upper end of which is attached to the conveyor belt 31 and the lower end of which carries an arcuate cup support 34, which cup support 34 extends about the circumference

of a circle, slightly over half of the total circumference thereof with the open portion of the circumference directed substantially rearwardly of the carriage during movement 5 thereof in carrying a cup to the dispense position.

Each cup dispense station comprises a cup dispense ring 35 supporting a stack 36 of cups 37 each cup in the stack associated with 10 one cup dispense station, either 13, 14, 15, 16 or 17 containing in the bottom of each a proportion of a single ingredient, such for example, as soluble coffee. The cup dispense ring 35 is operated by means of solenoid 38 15 to dispense a cup from the under surface of platform 10 into cup carriage 32 which is in juxtaposition to the cup dispense station concerned.

Each ingredient dispense station 18, and 20 19 respectively comprises an inverted bottle or container 39 having a depending neck 40 having a nozzle 41. Said neck 40 and associated nozzle 41 incorporating a valve means (not shown) operated by means of a solenoid 25 to dispense a portion of the ingredients of container 39.

Toward the extremity 20 of platform 10 there is provided a cup dispensing assembly 100. Adjacent cup dispensing assembly there 30 is provided a water dispense nozzle 44, (see Fig. 3).

In operation, cup dispensing stations 13, 35 14, 15, 16 and 17 each accommodate a stack of cups containing in each cup a portion of a beverage forming ingredient. Typical ingredients may be ox-tail soup in cup dispensing station 13, tomato soup in cup dispensing station 14, coffee in cup dispensing station 15, tea in cup dispensing station 16 and 40 cocoa in cup dispensing station 17. Ingredient dispensing station 18 contains mild and ingredient dispensing station 19 contains sugar.

In these circumstances the control circuit for the apparatus would arrange with a selection panel whereby the consumer could select the particular beverage and form of beverage that he requires.

Thus, for example, a selection of tomato soup would enable cup dispense station 14 50 and on giving the dispense instructions the conveyor is driven by motor 23 to present carriage 32 immediately below cup dispense station 14. The associated solenoid 38 is then triggered to release a cup 37 from the stack 55 of cups into the carriage 32 for support by cup support 34. On completion of the cup dispense the motor 23 will be re-energised to drive the conveyor and the associated carriage forwardly toward extremity 20 of platform 10. 60 The conveyor will continue to transport carriage 32 until cup dispensing assembly 100 disengages the cup from cup support 34.

Where an ingredient such, for example as coffee is selected, it may be that the consumer will also require a portion of milk 65

and/or sugar.

A cup is dispensed from cup dispensing station 15 as described above. On completion of the cup dispense cycle the conveyor belt 70 31 is driven forwardly by a motor 23 until cup carriage and the cup carried thereby is in juxtaposition with ingredient dispense station 18, whereupon the conveyor is stopped and the dispense valve associated with neck 40 of 75 the container at station 18 is energised to release ingredients into the cup. On completion of the ingredients dispensed into the cup, the conveyor motor 23 is re-energised and the carriage together with the associated cup is 80 advanced to ingredient dispensing station 19. Here the dispense cycle is repeated for a portion of sugar and on completion of the dispense the cup is then advanced for dispensing of the cup plus ingredients in a 85 manner described above.

It will be appreciated that any hybride of this machine can be employed. For example the machine can be adapted to provide all in-cup ingredients whereby a selection is made 90 between say coffee alone, coffee with milk or coffee with milk and sugar and different cup stacks can accommodate each of the separate ingredients. In the alternative the additional ingredients over and above the basic ingredient 95 can be dispensed using a combination of in-cup ingredient stacks and separate ingredient dispense means in the manner described above.

Referring now to Fig. 4 the cup dispense 100 assembly 100 comprises a conveyor guide 110 which accommodates a plurality of ingredient dispensing nozzles 111 and associated bottles of ingredients (not shown). A conveyor 111 has associated with it a carriage arm 112 and an associated cup support ring 113 having a depending spine portion 114. Each cup support 114 is adapted to support a generally frusto-conical disposable cup 115 having an open mouth 116 and a closed base 117, the 110 diameter of the open mouth 116 being greater than the diameter of the base 117 whereby the tapered wall 118 defines the frustum of a cone.

Toward the end of the conveyor travel there 115 is disposed a cup ramp 120 having a substantially horizontal cup receiving platform 121 and an approach ramp 122. In one embodiment of the invention, there is provided a water dispense nozzle 123 incorporating a 120 spray head.

In an alternative embodiment shown in Fig. 6, the cup support ring 133 is a substantially circumferential ring disposed in a substantially horizontal plane which is bent at its forward 125 end 130 so that ring 113 has a circumferential extent slightly greater than a semi-circle. The ring 113 is attached to the cup carriage by means 131 forming part of carriage 112, and the spine portion 114 extends toward the 130 low extremity of the cup 115. Spine portion

114 has a forward ext nsi n 132 adapted to engag under th base 117 of the cup dis- posed therein. The cup platform 121 has a ramp 122 as d scrib d above, ramp 122

- 5 being provided with a longitudinally extending recess 133 adapted to accommodate the ex- tended spine portion 114 and its associated forward extension 132. The extremity of for- ward travel of the cup support ring 113
- 10 determined by the forward extremity 134 of recess 133 and the abutment thereof of the forward extremity of projection 132.

In operation, the cup 115 is carried in the cup support ring 113 as shown in Fig. 4. The supported cup is then carried sequentially 15 passed the plurality of ingredient dispensing nozzles 111 where at selected nozzles the cup receives a charge of ingredient. On approach- ing the cup receiving platform 120 the for- 20 ward extremity of the base 117 of the cup abuts the inclined surface of ramp 122 and continued forward movement of the cup sup- port ring 113 and the associated conveyor carriage 112 in accordance with the move- 25 ment of the conveyor results in the cup sup- port ring 113 continuing in a substantially horizontal plane, but the forward edge of base 117 of the cup rides up the inclined ramp 122 until the situation is reached where the 30 spacing between the forward extremity of the cup support 130 and the cup support ring 113 is greater than the diameter of the cup in the plane of the ring. Continued forward movement results in the cup being located on 35 the surface 121 of the cup support platform 120 whereby reversal of the conveyor results in the cup remaining on the platform 121 for collection by the consumer, and disengage- ment of ring 113 from the cup. In one 40 embodiment of the invention on reversal of the conveyor a proportion of hot or cold liquid is dispensed via a dispensing nozzle 123 to complete the formation of a beverage.

In the embodiment shown with respect to 45 Fig. 6 the sequence of operation remains the same, but in this case where the ingredients in the cup are heavy, i.e. the cup has been filled with liquid before dispensing in this case, additional support for the cup is desir- 50 able and this is provided by the extended spine 114 and the forward extension 132 which engages under the base 117 of the cup. Operation of the cup dispensing assem- bly remains as described above with the ex- 55 tended arm entering the recess 133 as for- ward movement progresses.

By providing a cup dispense in this way the disengag ment of the cup from the arm is gradual and the rat at which disengagem nt 60 occurs can be controlled by the slope of th inclined ramp surface 122, so that a slow protracted disengagement can be employed. The act of disengag ment, i.e. the rev rsal of the conv y r does n t involv any shock t 65 th contents and in consequence, dispersal r

spillag of the contents of th cup n disen- gagement from the arm is substantially re- duced.

In the embodim nt illustrated in Fig. 7, the 70 cup receiving surface 121 is separated from ramp 122 by means of a partition 140. The partition 140 is erect and substantially per- pendicular to cup receiving surface 121 and has hingedly connected thereto a flap 141 75 arranged to hinge along an edge on the side of the cup path remote from the conveyor track, the flap 141 being adapted to hinge openly in the direction of travel of the cup as shown in Fig. 7. The flap is spring loaded to a 80 closed position shown as dotted line chain 142 in Fig. 7, the arrangement being such that with the flap 141 in a closed position a cup stationary on receiving surface 121 can- not be returned down ramp 122 into the 85 interior of the machine.

To retain the door in the open position the outer extremity 143 of cup support 113 is provided with a rearwardly projecting tab 44 adapted to retain door 141 in its open pos- 90 tion while the cup support 113 is forward of partition 140 the arrangement being such that tab 144 maintains the door in the open position to permit return of the cup support 113 rearwardly through partition 140 and 95 back to its datum position while leaving cup 115 on the cup receiving platform 121 for the consumer to complete preparation of the beverage.

This permits the interior of the machine 100 including cup ramp 122 to be isolated from the cup receiving platform 121 and the flap 141 serves to prevent a cup 115 being acci- dently or otherwise returned into the interior of the machine with the attendant hygiene 105 and maintenance problems.

#### CLAIMS

1. A cup dispensing assembly for a vend- ing machine which assembly comprises a cup 110 receiving platform for receiving a cup at a dispensing station in a vending machine, a cup transport means including a cup carriage and associated cup support for transport of a cup to said cup receiving platform, reversing 115 means for reversing the motion of the trans- port means when the cup is juxtaposed and supported by the cup receiving platform at the dispensing station, the arrangement being such that as the cup is conveyed forwardly 120 towards the cup dispensing station conver- gence between the receiving platform and the cup support occurs so that the cup rides up a surface of th platform wh reby continued forward mov ment of th cup carriage results 125 in further convergence between th cup sup- port and platform to produce relative m ve- m nt between the cup and the cup support to an extent sufficient for disengagement of th cup from th cup support on reversal of 130 transport means without substantial spillag of

the contents thereof.

2. An assembly as claimed in claim 1 wherein closure means are provided juxtaposed the receiving platform to prevent the cup returning down the ramp after disengagement from the cup support.

3. An assembly as claimed in claim 2 wherein the closure means is a spring loaded flap adapted to open to admit the cup and carriage and through which the carriage and associated cup support are returned after disengagement of the cup *per se*.

4. An assembly as claimed in claim 2 or claim 3 wherein the closure is spring loaded to a closed position and wherein the carriage has a restraining arm adapted to engage with the closure to maintain said closure in an open position to permit return of the carriage therethrough.

20 5. An assembly as claimed in any preceding claim wherein the cup receiving platform has a substantially horizontal planar surface and an inclined surface to provide convergence between the platform and the cup support, the arrangement being such that the carriage drives the cup up the inclined surface to the planar surface thereby raising the cup from the support so that on reversal of the transport means the cup support is disengaged from the cup and leaves the cup in a dispensing position.

35 6. An assembly as claimed in claim 5 where the cup is tapered towards its base to form a hollow frustoconical cone in which the open mouth has a greater area than the closed base.

40 7. An assembly as claimed in claim 5 or claim 6 wherein the cup support comprises a substantially horizontally disposed circumferential part ring element open in a front portion thereof when considered in the direction of forward travel.

45 8. An assembly as claimed in claim 7 wherein the said circumferential part ring element is provided with a downwardly depending spine portion adapted to provide support at the back of the cup in the direction of forward movement to distribute the pressure on the cup as the cup rides up the inclined plane of the cup platform.

50 9. An assembly as claimed in claim 7 or claim 8 wherein the spine extends downwardly to the base of the cup.

55 10. An assembly as claimed in claim 9 wherein the spine includes a forwardly extending portion adapted to engage under the base of the cup to provide positive support of the cup from the base and wherein the cup receiving platform is provided with a central recess in at least the inclined plan portion thereof adapted to accommodate the depending spine, spacing of the recess being sufficient to accommodate the depending spine and cup base support and to engage with the base 60 of the cup to urge the cup upwardly with

regard to the cup support ring for disengagement thereof to deposit the cup on the dispense platform.

11. A cup assembly as claimed in claim 1 70 and substantially as herein described with reference to and as illustrated in Figs. 4 to 7 of the accompanying drawings.

12. A vending machine comprising a cup transport means at least one cup receiving 75 station, a carriage member operatively connected with said transport means for movement between the cup receiving station and a cup dispensing assembly as claimed in any preceding claim, motor means for driving the 80 transport means, control means for controlling the movement of the transport means and a plurality of cups in at least one cup receiving station wherein each cup contains at least part of the ingredients for forming a beverage, the 85 arrangement being such that in operation the cup transport means is controlled to bring the carriage in juxtaposition with the cup receiving station whereby a cup containing ingredients is dispensed into the carriage and the 90 control means thereafter causes or allows the motor means to drive the conveyor and carriage to the cup dispensing station.

13. A vending machine as claimed in claim 12 wherein the cup transport means is 95 a conveyor of the kind described in our co-pending application No. 8789/78. Serial No. 1566853

14. A vending machine as claimed in claim 12 or claim 13 wherein a plurality of 100 cup receiving stations are provided each receiving station being associated with a different ingredient for forming a beverage and further including beverage selection means whereby on selecting a particular beverage 105 the transport means causes the carriage member to move in juxtaposition with the cup receiving station having a cup containing the desired ingredients for dispensing thereto.

15. A vending machine as claimed in 110 claim 14 where at least one ingredient dispense station is provided between the cup receiving stations and the cup dispense station so that additional ingredients is available for dispensing into a cup carried by said 115 carriage.

16. A vending machine as claimed in claims 12 to 15 and substantially as described with reference to Figs. 1 to 3, 4 and 5, 6 and 7 of the accompanying drawings.